

# SEQUENCE LISTING

<110> Rosanne M. Crooke  
Mark J. Graham

<120> ANTISENSE MODULATION OF APOLIPOPROTEIN(A) EXPRESSION

<130> ISPH-0595

<140>

<141>

<160> 41

<170> FastSEQ for Windows Version 4.0

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<223> Antisense Oligonucleotide

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<210> 2

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 2

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<210> 3

<211> 13938

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (46)...(13692)

<400> 3

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1

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Glu Val Val Leu Leu Leu Leu Leu Phe Leu Lys Ser Ala Ala Pro Glu  
5 10 15 20

caa agc cat gtg gtc cag gat tgc tac cat ggt gat gga cag agt tat 153

Gln	Ser	His	Val	Val	Gln	Asp	Cys	Tyr	His	Gly	Asp	Gly	Gln	Ser	Tyr	
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cga	ggc	acg	tac	tcc	acc	act	gtc	aca	gga	agg	acc	tgc	caa	gct	tg	201
Arg	Gly	Thr	Tyr	Ser	Thr	Thr	Val	Thr	Gly	Arg	Thr	Cys	Gln	Ala	Trp	
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tca	tct	atg	aca	cca	cat	caa	cat	aat	agg	acc	aca	gaa	aac	tac	cca	249
Ser	Ser	Met	Thr	Pro	His	Gln	His	Asn	Arg	Thr	Thr	Glu	Asn	Tyr	Pro	
		55					60					65				
aat	gct	ggc	ttg	atc	atg	aac	tac	tgc	agg	aat	cca	gat	gct	gtg	gca	297
Asn	Ala	Gly	Leu	Ile	Met	Asn	Tyr	Cys	Arg	Asn	Pro	Asp	Ala	Val	Ala	
	70					75					80					
gct	cct	tat	tgt	tat	acg	agg	gat	ccc	ggg	gtc	agg	tg	gag	tac	tgc	345
Ala	Pro	Tyr	Cys	Tyr	Thr	Arg	Asp	Pro	Gly	Val	Arg	Trp	Glu	Tyr	Cys	
	85				90					95					100	
aac	ctg	acg	caa	tgc	tca	gac	gca	gaa	ggg	act	gcc	gtc	gcg	cct	ccg	393
Asn	Leu	Thr	Gln	Cys	Ser	Asp	Ala	Glu	Gly	Thr	Ala	Val	Ala	Pro	Pro	
			105					110						115		
act	gtt	acc	ccg	gtt	cca	agc	cta	gag	gct	cct	tcc	gaa	caa	gca	ccg	441
Thr	Val	Thr	Pro	Val	Pro	Ser	Leu	Glu	Ala	Pro	Ser	Glu	Gln	Ala	Pro	
			120					125					130			
act	gag	caa	agg	cct	ggg	gtg	cag	gag	tgc	tac	cat	ggg	aat	gga	cag	489
Thr	Glu	Gln	Arg	Pro	Gly	Val	Gln	Glu	Cys	Tyr	His	Gly	Asn	Gly	Gln	
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agt	tat	cga	ggc	aca	tac	tcc	acc	act	gtc	aca	gga	aga	acc	tgc	caa	537
Ser	Tyr	Arg	Gly	Thr	Tyr	Ser	Thr	Thr	Val	Thr	Gly	Arg	Thr	Cys	Gln	
	150					155					160					
gct	tg	tca	tct	atg	aca	cca	cac	tcg	cat	agt	cgg	acc	cca	gaa	tac	585
Ala	Trp	Ser	Ser	Met	Thr	Pro	His	Ser	His	Ser	Arg	Thr	Pro	Glu	Tyr	
	165				170					175					180	
tac	cca	aat	gct	ggc	ttg	atc	atg	aac	tac	tgc	agg	aat	cca	gat	gct	633
Tyr	Pro	Asn	Ala	Gly	Leu	Ile	Met	Asn	Tyr	Cys	Arg	Asn	Pro	Asp	Ala	
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gtg	gca	gct	cct	tat	tgt	tat	acg	agg	gat	ccc	ggg	gtc	agg	tg	gag	681
Val	Ala	Ala	Pro	Tyr	Cys	Tyr	Thr	Arg	Asp	Pro	Gly	Val	Arg	Trp	Glu	
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Tyr	Cys	Asn	Leu	Thr	Gln	Cys	Ser	Asp	Ala	Glu	Gly	Thr	Ala	Val	Ala	
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Pro	Pro	Thr	Val	Thr	Pro	Val	Pro	Ser	Leu	Glu	Ala	Pro	Ser	Glu	Gln	
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gga cag agt tat cga ggc aca tac tcc acc act gtc aca gga aga acc				873
Gly Gln Ser Tyr Arg Gly Thr Tyr Ser Thr Thr Val Thr Gly Arg Thr	265	270	275	
tgc caa gct tgg tca tct atg aca cca cac tcg cat agt cgg acc cca				921
Cys Gln Ala Trp Ser Ser Met Thr Pro His Ser His Ser Arg Thr Pro	280	285	290	
gaa tac tac cca aat gct ggc ttg atc atg aac tac tgc agg aat cca				969
Glu Tyr Tyr Pro Asn Ala Gly Leu Ile Met Asn Tyr Cys Arg Asn Pro	295	300	305	
gat gct gtg gca gct cct tat tgt tat acg agg gat ccc ggt gtc agg				1017
Asp Ala Val Ala Ala Pro Tyr Cys Tyr Thr Arg Asp Pro Gly Val Arg	310	315	320	
tgg gag tac tgc aac ctg acg caa tgc tca gac gca gaa ggg act gcc				1065
Trp Glu Tyr Cys Asn Leu Thr Gln Cys Ser Asp Ala Glu Gly Thr Ala	325	330	335	340
gtc gcg cct ccg act gtt acc ccg gtt cca agc cta gag gct cct tcc				1113
Val Ala Pro Pro Thr Val Thr Pro Val Pro Ser Leu Glu Ala Pro Ser	345	350	355	
gaa caa gca ccg act gag caa agg cct ggg gtg cag gag tgc tac cat				1161
Glu Gln Ala Pro Thr Glu Gln Arg Pro Gly Val Gln Glu Cys Tyr His	360	365	370	
ggt aat gga cag agt tat cga ggc aca tac tcc acc act gtc aca gga				1209
Gly Asn Gly Gln Ser Tyr Arg Gly Thr Tyr Ser Thr Thr Val Thr Gly	375	380	385	
aga acc tgc caa gct tgg tca tct atg aca cca cac tcg cat agt cgg				1257
Arg Thr Cys Gln Ala Trp Ser Ser Met Thr Pro His Ser His Ser Arg	390	395	400	
acc cca gaa tac tac cca aat gct ggc ttg atc atg aac tac tgc agg				1305
Thr Pro Glu Tyr Tyr Pro Asn Ala Gly Leu Ile Met Asn Tyr Cys Arg	405	410	415	420
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Asn Pro Asp Ala Val Ala Ala Pro Tyr Cys Tyr Thr Arg Asp Pro Gly	425	430	435	
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Val Arg Trp Glu Tyr Cys Asn Leu Thr Gln Cys Ser Asp Ala Glu Gly	440	445	450	
act gcc gtc gcg cct ccg act gtt acc ccg gtt cca agc cta gag gct				1449
Thr Ala Val Ala Pro Pro Thr Val Thr Pro Val Pro Ser Leu Glu Ala	455	460	465	
cct tcc gaa caa gca ccg act gag caa agg cct ggg gtg cag gag tgc				1497
Pro Ser Glu Gln Ala Pro Thr Glu Gln Arg Pro Gly Val Gln Glu Cys	470	475	480	

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Tyr His Gly Asn Gly Gln Ser Tyr Arg Gly Thr Tyr Ser Thr Thr Val	
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Thr Gly Arg Thr Cys Gln Ala Trp Ser Ser Met Thr Pro His Ser His	
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Ser Arg Thr Pro Glu Tyr Tyr Pro Asn Ala Gly Leu Ile Met Asn Tyr	
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tgc agg aat cca gat gct gtg gca gct cct tat tgt tat acg agg gat	1689
Cys Arg Asn Pro Asp Ala Val Ala Ala Pro Tyr Cys Tyr Thr Arg Asp	
535 540 545	
ccc ggt gtc agg tgg gag tac tgc aac ctg acg caa tgc tca gac gca	1737
Pro Gly Val Arg Trp Glu Tyr Cys Asn Leu Thr Gln Cys Ser Asp Ala	
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Glu Gly Thr Ala Val Ala Pro Pro Thr Val Thr Pro Val Pro Ser Leu	
565 570 575 580	
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Glu Ala Pro Ser Glu Gln Ala Pro Thr Glu Gln Arg Pro Gly Val Gln	
585 590 595	
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Glu Cys Tyr His Gly Asn Gly Gln Ser Tyr Arg Gly Thr Tyr Ser Thr	
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act gtc aca gga aga acc tgc caa gct tgg tca tct atg aca cca cac	1929
Thr Val Thr Gly Arg Thr Cys Gln Ala Trp Ser Ser Met Thr Pro His	
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Ser His Ser Arg Thr Pro Glu Tyr Tyr Pro Asn Ala Gly Leu Ile Met	
630 635 640	
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Asn Tyr Cys Arg Asn Pro Asp Ala Val Ala Ala Pro Tyr Cys Tyr Thr	
645 650 655 660	
agg gat ccc ggt gtc agg tgg gag tac tgc aac ctg acg caa tgc tca	2073
Arg Asp Pro Gly Val Arg Trp Glu Tyr Cys Asn Leu Thr Gln Cys Ser	
665 670 675	
gac gca gaa ggg act gcc gtc gcg cct ccg act gtt acc ccg gtt cca	2121
Asp Ala Glu Gly Thr Ala Val Ala Pro Pro Thr Val Thr Pro Val Pro	
680 685 690	
agc cta gag gct cct tcc gaa caa gca ccg act gag caa agg cct ggg	2169
Ser Leu Glu Ala Pro Ser Glu Gln Ala Pro Thr Glu Gln Arg Pro Gly	
695 700 705	

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tcc acc act gtc aca gga aga acc tgc caa gct tgg tca tct atg aca Ser Thr Thr Val Thr Gly Arg Thr Cys Gln Ala Trp Ser Ser Met Thr 725 730 735 740	2265
cca cac tcg cat agt cgg acc cca gaa tac tac cca aat gct ggc ttg Pro His Ser His Ser Arg Thr Pro Glu Tyr Tyr Pro Asn Ala Gly Leu 745 750 755	2313
atc atg aac tac tgc agg aat cca gat gct gtg gca gct cct tat tgt Ile Met Asn Tyr Cys Arg Asn Pro Asp Ala Val Ala Ala Pro Tyr Cys 760 765 770	2361
tat acg agg gat ccc ggt gtc agg tgg gag tac tgc aac ctg acg caa Tyr Thr Arg Asp Pro Gly Val Arg Trp Glu Tyr Cys Asn Leu Thr Gln 775 780 785	2409
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cct ggg gtg cag gag tgc tac cat ggt aat gga cag agt tat cga ggc Pro Gly Val Gln Glu Cys Tyr His Gly Asn Gly Gln Ser Tyr Arg Gly 825 830 835	2553
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tat tgt tat acg agg gat ccc ggt gtc agg tgg gag tac tgc aac ctg Tyr Cys Tyr Thr Arg Asp Pro Gly Val Arg Trp Glu Tyr Cys Asn Leu 885 890 895 900	2745
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acc ccg gtt cca agc cta gag gct cct tcc gaa caa gca ccg act gag Thr Pro Val Pro Ser Leu Glu Ala Pro Ser Glu Gln Ala Pro Thr Glu 920 925 930	2841
caa agg cct ggg gtg cag gag tgc tac cat ggt aat gga cag agt tat	2889

Gln Arg Pro Gly Val Gln Glu Cys Tyr His Gly Asn Gly Gln Ser Tyr	
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cga ggc aca tac tcc acc act gtc aca gga aga acc tgc caa gct tgg	2937
Arg Gly Thr Tyr Ser Thr Thr Val Thr Gly Arg Thr Cys Gln Ala Trp	
950 955 960	
tca tct atg aca cca cac tcg cat agt cgg acc cca gaa tac tac cca	2985
Ser Ser Met Thr Pro His Ser His Ser Arg Thr Pro Glu Tyr Tyr Pro	
965 970 975 980	
aat gct ggc ttg atc atg aac tac tgc agg aat cca gat gct gtg gca	3033
Asn Ala Gly Leu Ile Met Asn Tyr Cys Arg Asn Pro Asp Ala Val Ala	
985 990 995	
gct cct tat tgt tat acg agg gat ccc ggt gtc agg tgg gag tac tgc	3081
Ala Pro Tyr Cys Tyr Thr Arg Asp Pro Gly Val Arg Trp Glu Tyr Cys	
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Ser Tyr Arg Gly Thr Tyr Ser Thr Thr Val Thr Gly Arg Thr Cys Gln	
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Tyr Cys Asn Leu Thr Gln Cys Ser Asp Ala Glu Gly Thr Ala Val Ala	
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Pro Pro Thr Val Thr Pro Val Pro Ser Leu Glu Ala Pro Ser Glu Gln	
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Ala Pro Thr Glu Gln Arg Pro Gly Val Gln Glu Cys Tyr His Gly Asn	

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Thr Gly Arg Thr Cys Gln Ala Trp Ser Ser Met Thr Pro His Ser His	
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Ser Arg Thr Pro Glu Tyr Tyr Pro Asn Ala Gly Leu Ile Met Asn Tyr	
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Cys Arg Asn Pro Asp Ala Val Ala Ala Pro Tyr Cys Tyr Thr Arg Asp	
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Pro Gly Val Arg Trp Glu Tyr Cys Asn Leu Thr Gln Cys Ser Asp Ala	
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Glu Gly Thr Ala Val Ala Pro Pro Thr Val Thr Pro Val Pro Ser Leu	
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Glu Ala Pro Ser Glu Gln Ala Pro Thr Glu Gln Arg Pro Gly Val Gln	
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Ser His Ser Arg Thr Pro Glu Tyr Tyr Pro Asn Ala Gly Leu Ile Met	
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Arg Asp Pro Gly Val Arg Trp Glu Tyr Cys Asn Leu Thr Gln Cys Ser	
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gac gca gaa ggg act gcc gtc gcg cct ccg act gtt acc ccg gtt cca	4857
Asp Ala Glu Gly Thr Ala Val Ala Pro Pro Thr Val Thr Pro Val Pro	
1590 1595 1600	
agc cta gag gct cct tcc gaa caa gca ccg act gag caa agg cct ggg	4905
Ser Leu Glu Ala Pro Ser Glu Gln Ala Pro Thr Glu Gln Arg Pro Gly	
1605 1610 1615 1620	





Gln Arg Pro Gly Val Gln Glu Cys Tyr His Gly Asn Gly Gln Ser Tyr	
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Arg Gly Thr Tyr Ser Thr Thr Val Thr Gly Arg Thr Cys Gln Ala Trp	
1865 1870 1875	
tca tct atg aca cca cac tcg cat agt cgg acc cca gaa tac tac cca	5721
Ser Ser Met Thr Pro His Ser His Ser Arg Thr Pro Glu Tyr Tyr Pro	
1880 1885 1890	
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Asn Ala Gly Leu Ile Met Asn Tyr Cys Arg Asn Pro Asp Ala Val Ala	
1895 1900 1905	
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Ala Pro Tyr Cys Tyr Thr Arg Asp Pro Gly Val Arg Trp Glu Tyr Cys	
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Asn Leu Thr Gln Cys Ser Asp Ala Glu Gly Thr Ala Val Ala Pro Pro	
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Thr Val Thr Pro Val Pro Ser Leu Glu Ala Pro Ser Glu Gln Ala Pro	
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Thr Glu Gln Arg Pro Gly Val Gln Glu Cys Tyr His Gly Asn Gly Gln	
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Ser Tyr Arg Gly Thr Tyr Ser Thr Thr Val Thr Gly Arg Thr Cys Gln	
1975 1980 1985	
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Ala Trp Ser Ser Met Thr Pro His Ser His Ser Arg Thr Pro Glu Tyr	
1990 1995 2000	
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Tyr Pro Asn Ala Gly Leu Ile Met Asn Tyr Cys Arg Asn Pro Asp Ala	
2005 2010 2015 2020	
gtg gca gct cct tat tgt tat acg agg gat ccc ggt gtc agg tgg gag	6153
Val Ala Ala Pro Tyr Cys Tyr Thr Arg Asp Pro Gly Val Arg Trp Glu	
2025 2030 2035	
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Tyr Cys Asn Leu Thr Gln Cys Ser Asp Ala Glu Gly Thr Ala Val Ala	
2040 2045 2050	
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Pro Pro Thr Val Thr Pro Val Pro Ser Leu Glu Ala Pro Ser Glu Gln	
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Ala Pro Thr Glu Gln Arg Pro Gly Val Gln Glu Cys Tyr His Gly Asn	

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tgc caa gct tgg tca tct atg aca cca cac tcg cat agt cgg acc cca Cys Gln Ala Trp Ser Ser Met Thr Pro His Ser His Ser Arg Thr Pro 2105 2110 2115			6393
gaa tac tac cca aat gct ggc ttg atc atg aac tac tgc agg aat cca Glu Tyr Tyr Pro Asn Ala Gly Leu Ile Met Asn Tyr Cys Arg Asn Pro 2120 2125 2130			6441
gat gct gtg gca gct cct tat tgt tat acg agg gat ccc ggt gtc agg Asp Ala Val Ala Ala Pro Tyr Cys Tyr Thr Arg Asp Pro Gly Val Arg 2135 2140 2145			6489
tgg gag tac tgc aac ctg acg caa tgc tca gac gca gaa ggg act gcc Trp Glu Tyr Cys Asn Leu Thr Gln Cys Ser Asp Ala Glu Gly Thr Ala 2150 2155 2160			6537
gtc gcg cct ccg act gtt acc ccg gtt cca agc cta gag gct cct tcc Val Ala Pro Pro Thr Val Thr Pro Val Pro Ser Leu Glu Ala Pro Ser 2165 2170 2175 2180			6585
gaa caa gca ccg act gag caa agg cct ggg gtg cag gag tgc tac cat Glu Gln Ala Pro Thr Glu Gln Arg Pro Gly Val Gln Glu Cys Tyr His 2185 2190 2195			6633
ggg aat gga cag agt tat cga ggc aca tac tcc acc act gtc aca gga Gly Asn Gly Gln Ser Tyr Arg Gly Thr Tyr Ser Thr Thr Val Thr Gly 2200 2205 2210			6681
aga acc tgc caa gct tgg tca tct atg aca cca cac tcg cat agt cgg Arg Thr Cys Gln Ala Trp Ser Ser Met Thr Pro His Ser His Ser Arg 2215 2220 2225			6729
acc cca gaa tac tac cca aat gct ggc ttg atc atg aac tac tgc agg Thr Pro Glu Tyr Tyr Pro Asn Ala Gly Leu Ile Met Asn Tyr Cys Arg 2230 2235 2240			6777
aat cca gat gct gtg gca gct cct tat tgt tat acg agg gat ccc ggt Asn Pro Asp Ala Val Ala Ala Pro Tyr Cys Tyr Thr Arg Asp Pro Gly 2245 2250 2255 2260			6825
gtc agg tgg gag tac tgc aac ctg acg caa tgc tca gac gca gaa ggg Val Arg Trp Glu Tyr Cys Asn Leu Thr Gln Cys Ser Asp Ala Glu Gly 2265 2270 2275			6873
act gcc gtc gcg cct ccg act gtt acc ccg gtt cca agc cta gag gct Thr Ala Val Ala Pro Pro Thr Val Thr Pro Val Pro Ser Leu Glu Ala 2280 2285 2290			6921
cct tcc gaa caa gca ccg act gag caa agg cct ggg gtg cag gag tgc Pro Ser Glu Gln Ala Pro Thr Glu Gln Arg Pro Gly Val Gln Glu Cys 2295 2300 2305			6969

tac	cat	ggt	aat	gga	cag	agt	tat	cga	ggc	aca	tac	tcc	acc	act	gtc	7017
Tyr	His	Gly	Asn	Gly	Gln	Ser	Tyr	Arg	Gly	Thr	Tyr	Ser	Thr	Thr	Val	
2310						2315				2320						
aca	gga	aga	acc	tgc	caa	gct	tgg	tca	tct	atg	aca	cca	cac	tcg	cat	7065
Thr	Gly	Arg	Thr	Cys	Gln	Ala	Trp	Ser	Ser	Met	Thr	Pro	His	Ser	His	
2325				2330						2335				2340		
agt	cgg	acc	cca	gaa	tac	tac	cca	aat	gct	ggc	ttg	atc	atg	aac	tac	7113
Ser	Arg	Thr	Pro	Glu	Tyr	Tyr	Pro	Asn	Ala	Gly	Leu	Ile	Met	Asn	Tyr	
				2345				2350						2355		
tgc	agg	aat	cca	gat	gct	gtg	gca	gct	cct	tat	tgt	tat	acg	agg	gat	7161
Cys	Arg	Asn	Pro	Asp	Ala	Val	Ala	Ala	Pro	Tyr	Cys	Tyr	Thr	Arg	Asp	
		2360						2365				2370				
ccc	ggt	gtc	agg	tgg	gag	tac	tgc	aac	ctg	acg	caa	tgc	tca	gac	gca	7209
Pro	Gly	Val	Arg	Trp	Glu	Tyr	Cys	Asn	Leu	Thr	Gln	Cys	Ser	Asp	Ala	
2375						2380						2385				
gaa	ggg	act	gcc	gtc	gcg	cct	ccg	act	ggt	acc	ccg	ggt	cca	agc	cta	7257
Glu	Gly	Thr	Ala	Val	Ala	Pro	Pro	Thr	Val	Thr	Pro	Val	Pro	Ser	Leu	
2390						2395				2400						
gag	gct	cct	tcc	gaa	caa	gca	ccg	act	gag	caa	agg	cct	ggg	gtg	cag	7305
Glu	Ala	Pro	Ser	Glu	Gln	Ala	Pro	Thr	Glu	Gln	Arg	Pro	Gly	Val	Gln	
2405				2410						2415				2420		
gag	tgc	tac	cat	ggt	aat	gga	cag	agt	tat	cga	ggc	aca	tac	tcc	acc	7353
Glu	Cys	Tyr	His	Gly	Asn	Gly	Gln	Ser	Tyr	Arg	Gly	Thr	Tyr	Ser	Thr	
				2425				2430						2435		
act	gtc	aca	gga	aga	acc	tgc	caa	gct	tgg	tca	tct	atg	aca	cca	cac	7401
Thr	Val	Thr	Gly	Arg	Thr	Cys	Gln	Ala	Trp	Ser	Ser	Met	Thr	Pro	His	
		2440						2445				2450				
tcg	cat	agt	cgg	acc	cca	gaa	tac	tac	cca	aat	gct	ggc	ttg	atc	atg	7449
Ser	His	Ser	Arg	Thr	Pro	Glu	Tyr	Tyr	Pro	Asn	Ala	Gly	Leu	Ile	Met	
2455						2460				2465						
aac	tac	tgc	agg	aat	cca	gat	gct	gtg	gca	gct	cct	tat	tgt	tat	acg	7497
Asn	Tyr	Cys	Arg	Asn	Pro	Asp	Ala	Val	Ala	Ala	Pro	Tyr	Cys	Tyr	Thr	
2470						2475				2480						
agg	gat	ccc	ggt	gtc	agg	tgg	gag	tac	tgc	aac	ctg	acg	caa	tgc	tca	7545
Arg	Asp	Pro	Gly	Val	Arg	Trp	Glu	Tyr	Cys	Asn	Leu	Thr	Gln	Cys	Ser	
2485				2490						2495				2500		
gac	gca	gaa	ggg	act	gcc	gtc	gcg	cct	ccg	act	ggt	acc	ccg	ggt	cca	7593
Asp	Ala	Glu	Gly	Thr	Ala	Val	Ala	Pro	Pro	Thr	Val	Thr	Pro	Val	Pro	
				2505				2510				2515				
agc	cta	gag	gct	cct	tcc	gaa	caa	gca	ccg	act	gag	caa	agg	cct	ggg	7641
Ser	Leu	Glu	Ala	Pro	Ser	Glu	Gln	Ala	Pro	Thr	Glu	Gln	Arg	Pro	Gly	

gtg	cag	gag	tgc	tac	cat	ggt	aat	gga	cag	agt	tat	cga	ggc	aca	tac	7689
Val	Gln	Glu	Cys	Tyr	His	Gly	Asn	Gly	Gln	Ser	Tyr	Arg	Gly	Thr	Tyr	
		2535				2540				2545						
tcc	acc	act	gtc	aca	gga	aga	acc	tgc	caa	gct	tgg	tca	tct	atg	aca	7737
Ser	Thr	Thr	Val	Thr	Gly	Arg	Thr	Cys	Gln	Ala	Trp	Ser	Ser	Met	Thr	
		2550				2555				2560						
cca	cac	tcg	cat	agt	cgg	acc	cca	gaa	tac	tac	cca	aat	gct	ggc	ttg	7785
Pro	His	Ser	His	Ser	Arg	Thr	Pro	Glu	Tyr	Tyr	Pro	Asn	Ala	Gly	Leu	
		2565				2570				2575		2580				
atc	atg	aac	tac	tgc	agg	aat	cca	gat	gct	gtg	gca	gct	cct	tat	tgt	7833
Ile	Met	Asn	Tyr	Cys	Arg	Asn	Pro	Asp	Ala	Val	Ala	Ala	Pro	Tyr	Cys	
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tat	acg	agg	gat	ccc	ggt	gtc	agg	tgg	gag	tac	tgc	aac	ctg	acg	caa	7881
Tyr	Thr	Arg	Asp	Pro	Gly	Val	Arg	Trp	Glu	Tyr	Cys	Asn	Leu	Thr	Gln	
		2600						2605				2610				
tgc	tca	gac	gca	gaa	ggg	act	gcc	gtc	gcg	cct	ccg	act	gtt	acc	ccg	7929
Cys	Ser	Asp	Ala	Glu	Gly	Thr	Ala	Val	Ala	Pro	Pro	Thr	Val	Thr	Pro	
		2615				2620				2625						
gtt	cca	agc	cta	gag	gct	cct	tcc	gaa	caa	gca	ccg	act	gag	cag	agg	7977
Val	Pro	Ser	Leu	Glu	Ala	Pro	Ser	Glu	Gln	Ala	Pro	Thr	Glu	Gln	Arg	
		2630				2635				2640						
cct	ggg	gtg	cag	gag	tgc	tac	cac	ggt	aat	gga	cag	agt	tat	cga	ggc	8025
Pro	Gly	Val	Gln	Glu	Cys	Tyr	His	Gly	Asn	Gly	Gln	Ser	Tyr	Arg	Gly	
		2645				2650				2655		2660				
aca	tac	tcc	acc	act	gtc	act	gga	aga	acc	tgc	caa	gct	tgg	tca	tct	8073
Thr	Tyr	Ser	Thr	Thr	Val	Thr	Gly	Arg	Thr	Cys	Gln	Ala	Trp	Ser	Ser	
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atg	aca	cca	cac	tcg	cat	agt	cgg	acc	cca	gaa	tac	tac	cca	aat	gct	8121
Met	Thr	Pro	His	Ser	His	Ser	Arg	Thr	Pro	Glu	Tyr	Tyr	Pro	Asn	Ala	
		2680				2685				2690						
ggc	ttg	atc	atg	aac	tac	tgc	agg	aat	cca	gat	gct	gtg	gca	gct	cct	8169
Gly	Leu	Ile	Met	Asn	Tyr	Cys	Arg	Asn	Pro	Asp	Ala	Val	Ala	Ala	Pro	
		2695				2700				2705						
tat	tgt	tat	acg	agg	gat	ccc	ggt	gtc	agg	tgg	gag	tac	tgc	aac	ctg	8217
Tyr	Cys	Tyr	Thr	Arg	Asp	Pro	Gly	Val	Arg	Trp	Glu	Tyr	Cys	Asn	Leu	
		2710				2715				2720						
acg	caa	tgc	tca	gac	gca	gaa	ggg	act	gcc	gtc	gcg	cct	ccg	act	gtt	8265
Thr	Gln	Cys	Ser	Asp	Ala	Glu	Gly	Thr	Ala	Val	Ala	Pro	Pro	Thr	Val	
		2725				2730				2735		2740				
acc	ccg	gtt	cca	agc	cta	gag	gct	cct	tcc	gaa	caa	gca	ccg	act	gag	8313
Thr	Pro	Val	Pro	Ser	Leu	Glu	Ala	Pro	Ser	Glu	Gln	Ala	Pro	Thr	Glu	
				2745				2750				2755				

Gln Arg Pro Gly Val Gln Glu Cys Tyr His Gly Asn Gly Gln Ser Tyr	
2760	2765 2770
cga ggc aca tac tcc acc act gtc aca gga aga acc tgc caa gct tgg	8409
Arg Gly Thr Tyr Ser Thr Thr Val Thr Gly Arg Thr Cys Gln Ala Trp	
2775	2780 2785
tca tct atg aca cca cac tcg cat agt cgg acc cca gaa tac tac cca	8457
Ser Ser Met Thr Pro His Ser His Ser Arg Thr Pro Glu Tyr Tyr Pro	
2790	2795 2800
aat gct ggc ttg atc atg aac tac tgc agg aat cca gat gct gtg gca	8505
Asn Ala Gly Leu Ile Met Asn Tyr Cys Arg Asn Pro Asp Ala Val Ala	
2805	2810 2815 2820
gct cct tat tgt tat acg agg gat ccc ggt gtc agg tgg gag tac tgc	8553
Ala Pro Tyr Cys Tyr Thr Arg Asp Pro Gly Val Arg Trp Glu Tyr Cys	
2825	2830 2835
aac ctg acg caa tgc tca gac gca gaa ggg act gcc gtc gcg cct ccg	8601
Asn Leu Thr Gln Cys Ser Asp Ala Glu Gly Thr Ala Val Ala Pro Pro	
2840	2845 2850
act gtt acc ccg gtt cca agc cta gag gct cct tcc gaa caa gca ccg	8649
Thr Val Thr Pro Val Pro Ser Leu Glu Ala Pro Ser Glu Gln Ala Pro	
2855	2860 2865
act gag caa agg cct ggg gtg cag gag tgc tac cat ggt aat gga cag	8697
Thr Glu Gln Arg Pro Gly Val Gln Glu Cys Tyr His Gly Asn Gly Gln	
2870	2875 2880
agt tat cga ggc aca tac tcc acc act gtc aca gga aga acc tgc caa	8745
Ser Tyr Arg Gly Thr Tyr Ser Thr Thr Val Thr Gly Arg Thr Cys Gln	
2885	2890 2895 2900
gct tgg tca tct atg aca cca cac tcg cat agt cgg acc cca gaa tac	8793
Ala Trp Ser Ser Met Thr Pro His Ser His Ser Arg Thr Pro Glu Tyr	
2905	2910 2915
tac cca aat gct ggc ttg atc atg aac tac tgc agg aat cca gat gct	8841
Tyr Pro Asn Ala Gly Leu Ile Met Asn Tyr Cys Arg Asn Pro Asp Ala	
2920	2925 2930
gtg gca gct cct tat tgt tat acg agg gat ccc ggt gtc agg tgg gag	8889
Val Ala Ala Pro Tyr Cys Tyr Thr Arg Asp Pro Gly Val Arg Trp Glu	
2935	2940 2945
tac tgc aac ctg acg caa tgc tca gac gca gaa ggg act gcc gtc gcg	8937
Tyr Cys Asn Leu Thr Gln Cys Ser Asp Ala Glu Gly Thr Ala Val Ala	
2950	2955 2960
cct ccg act gtt acc ccg gtt cca agc cta gag gct cct tcc gaa caa	8985
Pro Pro Thr Val Thr Pro Val Pro Ser Leu Glu Ala Pro Ser Glu Gln	
2965	2970 2975 2980
gca ccg act gag cag agg cct ggg gtg cag gag tgc tac cac ggt aat	9033
Ala Pro Thr Glu Gln Arg Pro Gly Val Gln Glu Cys Tyr His Gly Asn	

	2985	2990	2995	
	gga cag agt tat cga ggc aca tac tcc acc act gtc act gga aga acc			9081
	Gly Gln Ser Tyr Arg Gly Thr Tyr Ser Thr Thr Val Thr Gly Arg Thr			
	3000	3005	3010	
	tgc caa gct tgg tca tct atg aca cca cac tcg cat agt cgg acc cca			9129
	Cys Gln Ala Trp Ser Ser Met Thr Pro His Ser His Ser Arg Thr Pro			
	3015	3020	3025	
	gaa tac tac cca aat gct ggc ttg atc atg aac tac tgc agg aat cca			9177
	Glu Tyr Tyr Pro Asn Ala Gly Leu Ile Met Asn Tyr Cys Arg Asn Pro			
	3030	3035	3040	
	gat gct gtg gca gct cct tat tgt tat acg agg gat ccc ggt gtc agg			9225
	Asp Ala Val Ala Ala Pro Tyr Cys Tyr Thr Arg Asp Pro Gly Val Arg			
	3045	3050	3055	3060
	tgg gag tac tgc aac ctg acg caa tgc tca gac gca gaa ggg act gcc			9273
	Trp Glu Tyr Cys Asn Leu Thr Gln Cys Ser Asp Ala Glu Gly Thr Ala			
	3065	3070	3075	
	gtc gcg cct ccg act gtt acc ccg gtt cca agc cta gag gct cct tcc			9321
	Val Ala Pro Pro Thr Val Thr Pro Val Pro Ser Leu Glu Ala Pro Ser			
	3080	3085	3090	
	gaa caa gca ccg act gag cag agg cct ggg gtg cag gag tgc tac cac			9369
	Glu Gln Ala Pro Thr Glu Gln Arg Pro Gly Val Gln Glu Cys Tyr His			
	3095	3100	3105	
	ggg aat gga cag agt tat cga ggc aca tac tcc acc act gtc act gga			9417
	Gly Asn Gly Gln Ser Tyr Arg Gly Thr Tyr Ser Thr Thr Val Thr Gly			
	3110	3115	3120	
	aga acc tgc caa gct tgg tca tct atg aca cca cac tcg cat agt cgg			9465
	Arg Thr Cys Gln Ala Trp Ser Ser Met Thr Pro His Ser His Ser Arg			
	3125	3130	3135	3140
	acc cca gaa tac tac cca aat gct ggc ttg atc atg aac tac tgc agg			9513
	Thr Pro Glu Tyr Tyr Pro Asn Ala Gly Leu Ile Met Asn Tyr Cys Arg			
	3145	3150	3155	
	aat cca gat gct gtg gca gct cct tat tgt tat acg agg gat ccc ggt			9561
	Asn Pro Asp Ala Val Ala Ala Pro Tyr Cys Tyr Thr Arg Asp Pro Gly			
	3160	3165	3170	
	gtc agg tgg gag tac tgc aac ctg acg caa tgc tca gac gca gaa ggg			9609
	Val Arg Trp Glu Tyr Cys Asn Leu Thr Gln Cys Ser Asp Ala Glu Gly			
	3175	3180	3185	
	act gcc gtc gcg cct ccg act gtt acc ccg gtt cca agc cta gag gct			9657
	Thr Ala Val Ala Pro Pro Thr Val Thr Pro Val Pro Ser Leu Glu Ala			
	3190	3195	3200	
	cct tcc gaa caa gca ccg act gag cag agg cct ggg gtg cag gag tgc			9705
	Pro Ser Glu Gln Ala Pro Thr Glu Gln Arg Pro Gly Val Gln Glu Cys			
	3205	3210	3215	3220

tac	cac	ggt	aat	gga	cag	agt	tat	cga	ggc	aca	tac	tcc	acc	act	gtc	9753
Tyr	His	Gly	Asn	Gly	Gln	Ser	Tyr	Arg	Gly	Thr	Tyr	Ser	Thr	Thr	Val	
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act	gga	aga	acc	tgc	caa	gct	tgg	tca	tct	atg	aca	cca	cac	tcg	cat	9801
Thr	Gly	Arg	Thr	Cys	Gln	Ala	Trp	Ser	Ser	Met	Thr	Pro	His	Ser	His	
			3240					3245					3250			
agt	cgg	acc	cca	gaa	tac	tac	cca	aat	gct	ggc	ttg	atc	atg	aac	tac	9849
Ser	Arg	Thr	Pro	Glu	Tyr	Tyr	Pro	Asn	Ala	Gly	Leu	Ile	Met	Asn	Tyr	
		3255					3260					3265				
tgc	agg	aat	cca	gat	gct	gtg	gca	gct	cct	tat	tgt	tat	acg	agg	gat	9897
Cys	Arg	Asn	Pro	Asp	Ala	Val	Ala	Ala	Pro	Tyr	Cys	Tyr	Thr	Arg	Asp	
	3270					3275					3280					
ccc	ggt	gtc	agg	tgg	gag	tac	tgc	aac	ctg	acg	caa	tgc	tca	gac	gca	9945
Pro	Gly	Val	Arg	Trp	Glu	Tyr	Cys	Asn	Leu	Thr	Gln	Cys	Ser	Asp	Ala	
3285					3290				3295						3300	
gaa	ggg	act	gcc	gtc	gcg	cct	ccg	act	gtt	acc	ccg	gtt	cca	agc	cta	9993
Glu	Gly	Thr	Ala	Val	Ala	Pro	Pro	Thr	Val	Thr	Pro	Val	Pro	Ser	Leu	
			3305						3310					3315		
gag	gct	cct	tcc	gaa	caa	gca	ccg	act	gag	cag	agg	cct	ggg	gtg	cag	10041
Glu	Ala	Pro	Ser	Glu	Gln	Ala	Pro	Thr	Glu	Gln	Arg	Pro	Gly	Val	Gln	
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gag	tgc	tac	cac	ggt	aat	gga	cag	agt	tat	cga	ggc	aca	tac	tcc	acc	10089
Glu	Cys	Tyr	His	Gly	Asn	Gly	Gln	Ser	Tyr	Arg	Gly	Thr	Tyr	Ser	Thr	
		3335				3340					3345					
act	gtc	act	gga	aga	acc	tgc	caa	gct	tgg	tca	tct	atg	aca	cca	cac	10137
Thr	Val	Thr	Gly	Arg	Thr	Cys	Gln	Ala	Trp	Ser	Ser	Met	Thr	Pro	His	
	3350					3355				3360						
tcg	cat	agt	cgg	acc	cca	gaa	tac	tac	cca	aat	gct	ggc	ttg	atc	atg	10185
Ser	His	Ser	Arg	Thr	Pro	Glu	Tyr	Tyr	Pro	Asn	Ala	Gly	Leu	Ile	Met	
3365					3370				3375					3380		
aac	tac	tgc	agg	aat	cca	gat	cct	gtg	gca	gcc	cct	tat	tgt	tat	acg	10233
Asn	Tyr	Cys	Arg	Asn	Pro	Asp	Pro	Val	Ala	Ala	Pro	Tyr	Cys	Tyr	Thr	
			3385					3390					3395			
agg	gat	ccc	agt	gtc	agg	tgg	gag	tac	tgc	aac	ctg	aca	caa	tgc	tca	10281
Arg	Asp	Pro	Ser	Val	Arg	Trp	Glu	Tyr	Cys	Asn	Leu	Thr	Gln	Cys	Ser	
			3400				3405					3410				
gac	gca	gaa	ggg	act	gcc	gtc	gcg	cct	cca	act	att	acc	ccg	att	cca	10329
Asp	Ala	Glu	Gly	Thr	Ala	Val	Ala	Pro	Pro	Thr	Ile	Thr	Pro	Ile	Pro	



gtg cag gag tgc tac cac gga aat gga cag agt tat caa ggc aca tac Val Gln Glu Cys Tyr His Gly Asn Gly Gln Ser Tyr Gln Gly Thr Tyr 3445 3450 3455 3460	10425
ttc att act gtc aca gga aga acc tgc caa gct tgg tca tct atg aca Phe Ile Thr Val Thr Gly Arg Thr Cys Gln Ala Trp Ser Ser Met Thr 3465 3470 3475	10473
cca cac tcg cat agt cgg acc cca gca tac tac cca aat gct ggc ttg Pro His Ser His Ser Arg Thr Pro Ala Tyr Tyr Pro Asn Ala Gly Leu 3480 3485 3490	10521
atc aag aac tac tgc cga aat cca gat cct gtg gca gcc cct tgg tgt Ile Lys Asn Tyr Cys Arg Asn Pro Asp Pro Val Ala Ala Pro Trp Cys 3495 3500 3505	10569
tat aca aca gat ccc agt gtc agg tgg gag tac tgc aac ctg aca cga Tyr Thr Thr Asp Pro Ser Val Arg Trp Glu Tyr Cys Asn Leu Thr Arg 3510 3515 3520	10617
tgc tca gat gca gaa tgg act gcc ttc gtc cct ccg aat gtt att ctg Cys Ser Asp Ala Glu Trp Thr Ala Phe Val Pro Pro Asn Val Ile Leu 3525 3530 3535 3540	10665
gct cca agc cta gag gct ttt ttt gaa caa gca ctg act gag gaa acc Ala Pro Ser Leu Glu Ala Phe Phe Glu Gln Ala Leu Thr Glu Glu Thr 3545 3550 3555	10713
ccc ggg gta cag gac tgc tac tac cat tat gga cag agt tac cga ggc Pro Gly Val Gln Asp Cys Tyr Tyr His Tyr Gly Gln Ser Tyr Arg Gly 3560 3565 3570	10761
aca tac tcc acc act gtc aca gga aga act tgc caa gct tgg tca tct Thr Tyr Ser Thr Thr Val Thr Gly Arg Thr Cys Gln Ala Trp Ser Ser 3575 3580 3585	10809
atg aca cca cac cag cat agt cgg acc cca gaa aac tac cca aat gct Met Thr Pro His Gln His Ser Arg Thr Pro Glu Asn Tyr Pro Asn Ala 3590 3595 3600	10857
ggc ctg acc agg aac tac tgc agg aat cca gat gct gag att cgc cct Gly Leu Thr Arg Asn Tyr Cys Arg Asn Pro Asp Ala Glu Ile Arg Pro 3605 3610 3615 3620	10905
tgg tgt tac acc atg gat ccc agt gtc agg tgg gag tac tgc aac ctg Trp Cys Tyr Thr Met Asp Pro Ser Val Arg Trp Glu Tyr Cys Asn Leu 3625 3630 3635	10953
aca caa tgc ctg gtg aca gaa tca agt gtc ctt gca act ctc acg gtg Thr Gln Cys Leu Val Thr Glu Ser Ser Val Leu Ala Thr Leu Thr Val 3640 3645 3650	11001
gtc cca gat cca agc aca gag gct tct tct gaa gaa gca cca acg gag Val Pro Asp Pro Ser Thr Glu Ala Ser Ser Glu Glu Ala Pro Thr Glu 3655 3660 3665	11049
caa agc ccc ggg gtc cag gat tgc tac cat ggt gat gga cag agt tat	11097

Gln Ser Pro Gly Val Gln Asp Cys Tyr His Gly Asp Gly Gln Ser Tyr	
3670	3675 3680
cga ggc tca ttc tct acc act gtc aca gga agg aca tgt cag tct tgg	11145
Arg Gly Ser Phe Ser Thr Thr Val Thr Gly Arg Thr Cys Gln Ser Trp	
3685	3690 3695 3700
tcc tct atg aca cca cac tgg cat cag agg aca aca gaa tat tat cca	11193
Ser Ser Met Thr Pro His Trp His Gln Arg Thr Thr Glu Tyr Tyr Pro	
	3705 3710 3715
aat ggt ggc ctg acc agg aac tac tgc agg aat cca gat gct gag att	11241
Asn Gly Gly Leu Thr Arg Asn Tyr Cys Arg Asn Pro Asp Ala Glu Ile	
	3720 3725 3730
agt cct tgg tgt tat acc atg gat ccc aat gtc aga tgg gag tac tgc	11289
Ser Pro Trp Cys Tyr Thr Met Asp Pro Asn Val Arg Trp Glu Tyr Cys	
	3735 3740 3745
aac ctg aca caa tgt cca gtg aca gaa tca agt gtc ctt gcg acg tcc	11337
Asn Leu Thr Gln Cys Pro Val Thr Glu Ser Ser Val Leu Ala Thr Ser	
	3750 3755 3760
acg gct gtt tct gaa caa gca cca acg gag caa agc ccc aca gtc cag	11385
Thr Ala Val Ser Glu Gln Ala Pro Thr Glu Gln Ser Pro Thr Val Gln	
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